



# ANATOMY & PHYSIOLOGY

Read the General Rules in the manuals and on [www.soinc.org](http://www.soinc.org) as they apply to every event.

1. **DESCRIPTION:** Students will demonstrate an understanding of the basic anatomy and physiology of the Cardiovascular, Integumentary and Immune systems.

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:** Each team may bring one 8.5" x 11" sheet of paper that may contain information on both sides in any form from any source and up to two non-programmable, non-graphing calculators.

3. **THE COMPETITION:** The test is **limited** to the following topics:

a. **INTEGUMENTARY SYSTEM:**

- i. Functions of the Integumentary System
- ii. Basic anatomy of the component parts of the skin
- iii. Anatomy of the layers of the skin and sensory receptors
- iv. Skin Color and Texture, Hair and Nails, Integumentary Glands
- v. Effects of aging on the skin
- vi. The diseases on each level from the cell to the whole person as listed: burns, allergies to allergens (i.e., poison ivy, metals), infections (i.e., boils, carbuncles, athlete's foot, impetigo) and skin cancer

**National Level Only:**

- vii. Additional disorders: psoriasis, human papilloma virus (HPV) and scabies
- viii. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

b. **IMMUNE SYSTEM:**

- i. Basic Functions of the Immune System
- ii. Anatomy and physiology of nonspecific defense system
- iii. Anatomy and physiology of specific defense system
- iv. The physiology of the immune response and allergic reactions
- v. Role of the Lymph System in immunity
- vi. Disorders: immunodeficiencies (i.e., AIDS), autoimmune diseases (i.e., multiple sclerosis, rheumatoid arthritis & systemic lupus erythematosus), and hypersensitivities (i.e., contact dermatitis)

**National Level Only:**

- vii. Types of Organ Transplants and Prevention of Rejection
- viii. Additional disorder: Grave's Disease
- ix. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

c. **CARDIOVASCULAR SYSTEM:**

- i. The Heart - chambers and valves of the heart, electrical stimulation of myocardial tissue, pacemaker tissue, interpreting ECG (EKG) readings
- ii. Blood Vessels - arteries, arterioles, veins, venules, capillaries
- iii. Blood - plasma, hematocrit, red blood cells, oxygen transport, hemoglobin, platelets and blood clotting, regulation of blood plasma volume and acidity, blood typing & basic genetics of ABO, Rh, and MN blood types including paternity mysteries
- iv. Measurement of the pulse rate and blood pressure
- v. Relevant calculations include systolic and diastolic pressure, mean arterial pressure, stroke volume and cardiac output
- vi. Disorders: Congestive Heart Failure, Atrial Fibrillation, Myocardial Infarction, Atherosclerosis, Bradycardia and Tachycardia
- vii. Effects of exercise, smoking, alcohol, caffeine and drugs on the cardiovascular system

**National Level Only:**

- viii. Blood Vessels- continuous vs. fenestrated capillaries, blood brain barrier
- ix. Lymphatic System- white blood cells, lymph nodes, lymph ducts, lymphatic capillaries, lymphoid organs (spleen, thymus), tissue fluid
- x. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

4. **SCORING:** High score wins. Selected questions/quality of free-response answers will be used to break ties.

**Recommended Resources:** All reference and training resources including the in-depth **Anatomy and Physiology CD (APCD)** and the introductory **Bio/Earth CD (BECD)** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>

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